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Full Length Article

# Capital flows under global uncertainties: Evidence from Turkey

Oğuzhan Çepni [a,b,*], Mehmet Selman Çolak [a], Yavuz Selim Hacıhasanoğlu [a], Muhammed Hasan Yılmaz [a,c]

[a] *Central Bank of the Republic of Turkey, Hacı Bayram Mah. Istiklal Cad. No:10, Ankara, 06050, Turkey*
[b] *Copenhagen Business School, Department of Economics, Porcelænshaven 16A, Frederiksberg DK-2000, Denmark*
[c] *University of St Andrews, School of Management, Gateway Building, St Andrews, Fife, KY16 9RJ, UK*

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**Abstract**

This paper investigates the effects of global economic uncertainty and trade policy–related uncertainty in the US in predicting the bond and equity flows to Turkey during the period from January 2008 to November 2019. We use the time-varying Granger-causality test to assess the ability of economic policy uncertainty and capital flows to forecast Turkish equity and bond markets using fund-level data on bond and equity inflows compiled by the Emerging Portfolio Fund Research (EPFR) global database. Although we found no evidence of causality in the standard Granger-causality test, the time-varying robust causality test detects significant episodes that imply a causal relationship between capital flows and uncertainty indexes, especially during the global financial crisis and the election of the Trump administration.


*JEL classification:* C32; E32

*Keywords:* Capital flows; Global economic policy uncertainty; Time-varying multivariate causality; Trade policy uncertainty in the United States

## 1. Introduction and literature review

A substantial surge in capital flows to emerging markets (EMs) has occurred in recent decades. The rising global appetite for risk in an environment of low interest rates and abundant liquidity in developed countries, coupled with improving growth prospects in individual EMs, has expanded the cash flows to domestic financial instruments. These trends helped EMs fill their savings gaps, finance their current account deficits, and access relatively cheaper global funds. Furthermore, because of the rise in real exchange rates in times of robust capital inflows, EMs recently enjoyed low and less-volatile inflation, which had not been seen in their history before the 2000s. Because of these favorable liquidity conditions, in the post–global financial crisis (GFC) period, the Turkish economy did not experience a major financial crisis due to either regional or global spillover, which had been observed on several earlier occasions (Comert & Selman 2018). Nevertheless, the GFC, mainly initiated in developed countries, had implications for the EMs because they are highly dependent on external capital due to a low savings rate. Apart from the GFC, in some cases, the reductions in the capital inflows have led to signs of financial instability, including volatility in exchange rates and inflation as well as bankruptcies. Examples include the European sovereign debt crisis in the second half of 2011, the so-called taper tantrum after May 2013, and normalization of monetary policy by the US Federal Reserve (the Fed) from 2015 until late 2016 (Fig. 1). Overall, although capital flows contributed to a positive growth environment and less-volatile inflation and exchange rates in EMs, they also resulted in high debt in EMs (Fig. 2) and led to significant instability in their financial markets because of the potential for sudden reductions in capital flows.

* Corresponding author.
*E-mail address:* Oguzhan.Cepni@tcmb.gov.tr (O. Çepni).
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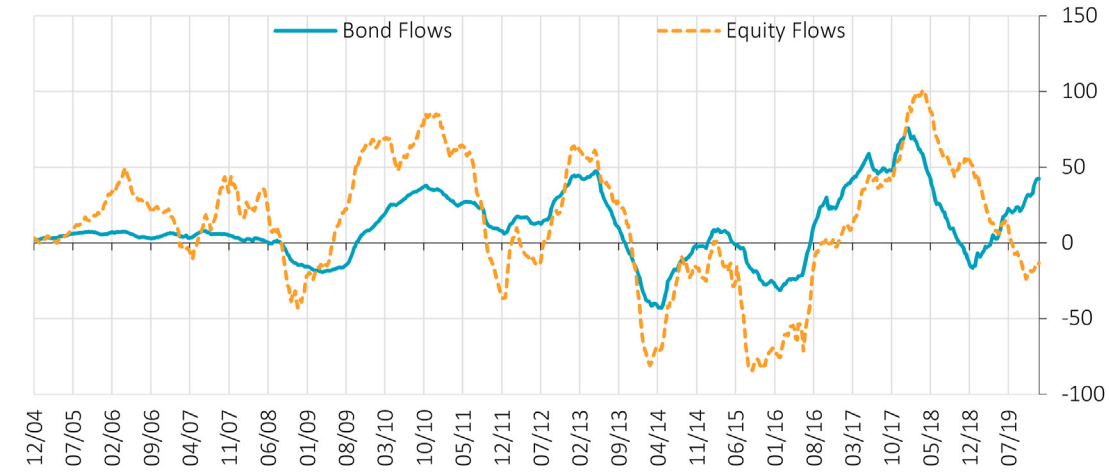
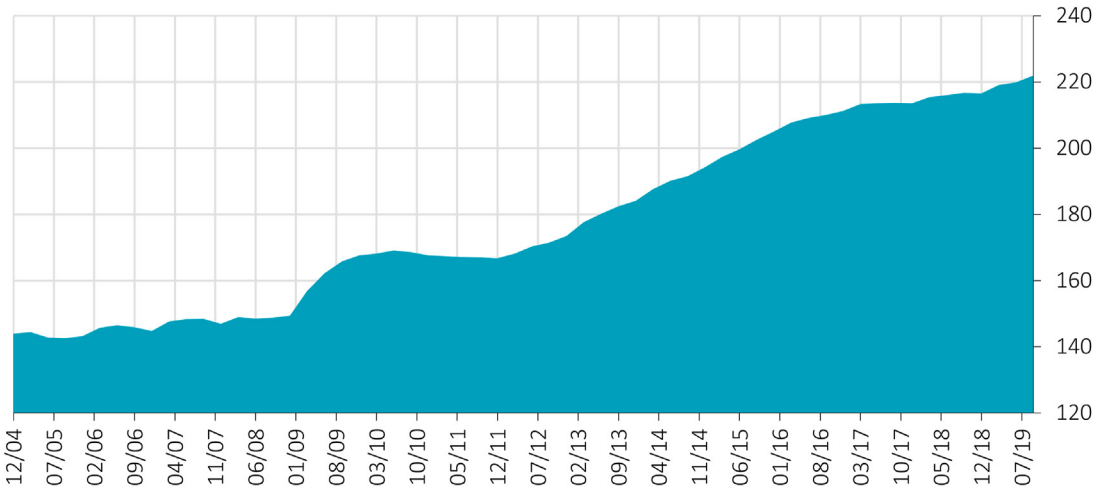



Source: EPFR

Fig. 1. Capital flows to EM economies (52-weeks cumulative, Billion USD). Source: EPFR.




Source: Institute of International Finance

Fig. 2. Average indebtedness of EM economies (as a percentage of GDP). Source: Institute of International Finance.

Capital flows, which play a critical role in macrofinancial balance in EMs, have been investigated in several empirical finance papers. Specifically, the determinants of capital flows as well as the pull-push factors that affect the size and direction of flows into EMs have been the main focus of researchers (Calvo, Leiderman and Reinhart, 1993; Fernandez-Arias, 1996). Pull factors include domestic macrofinancial forces and institutional structures that determine the attractiveness of the EMs as destinations for that capital flow (IMF, 2012). Growth performance, the current account balance, per capita income, domestic credit rating, exchange rate premium, stock market return, and gross foreign exchange reserves are some of the significant macrofinancial pull factors mentioned in the literature (Ahmed & Zlate, 2014; Chuhan, Claessens and Mamingi 1998; Gupta & Ratha, 2000; Ralhan, 2006; Taylor & Sarno, 1997). Other pull factors concern the institutional setting and macroeconomic policy design of the domestic country, such as financial openness, capital controls, institutional quality, and opacity in policy-making bodies (Byrne & Fiess, 2016; Hooper & Kim, 2007).

Push factors mostly correspond to global or source-country forces that determine the supply of funds to EMs. Global liquidity conditions, interest rates in developed countries, the monetary policy stance of developed economies, financial crises in other countries, investor risk aversion, the US growth rate, and the stock market performance in developed countries are examples of the push factors found to be significantly effective in explaining capital flows to EMs in the literature (Calvo et al., 1993; Fratzscher, 2012; Jevcak et al., 2010; Pappas, 2011). In the most recent example, after the GFC, relaxation in monetary policy, abundant global liquidity backed up by quantitative easing, and “risk-taking” behavior

by investors (due to very low yields in developed markets) all had enhanced capital flows toward EMs. In addition to these global macrofinancial push factors, uncertainty in the macro policies of countries or international institutions and political or trade-related agreements or tensions are among the push factors, specifically in the literature on post-GFC era. Fedderke and Liu (2002) find that changes in political rights and political instability significantly affect capital flows in South Africa. Schmidt and Zwick (2015) document that uncertainty about economic prospects as well as the course of economic policies explain the large changes in capital flows in the euro area after the GFC. Similarly, Gauvin, McLoughlin, and Reinhardt (2014) demonstrate that increases in macroeconomic policy uncertainty originating in the US and the European Union (EU) reduce the capital flows to EMs. A growing literature investigates the effect of policy uncertainty on bonds (on Italy, Handler & Jankowitsch, 2019; on the US, Tran & Phan, 2017; Waisman Ye and Zhu, 2015) and equity markets (on the US, Antonakakis, Chatziantoniou and Filis, 2013; Kang, Gracia and Ratti, 2017; Liu & Zhang, 2015; Sum & Fanta, 2012; on China and India, Li, Balcilar, Gupta and Chang, 2016; on the BRIC [Brazil, Russia, India, and China] countries, Dakhlaoui & Aloui, 2016; on the US, Europe, Asia, and Islamic stock markets, Hammoudeh, Kim and Sarafrazi, 2016; on Latin America and EMs, Sarwar & Khan, 2017; on 24 EMs, Das, Kannadhasan and Bhattacharyya, 2019). These studies show the negative price and volatility effects of economic policy uncertainty (EPU) on stock and bond markets.

Although many papers have been written on how policy uncertainty relates to capital flows in individual EMs, to the best of our knowledge, this is the first study to investigate how the relationship between capital flows and policy uncertainty changes over time in the Turkish economy. The principal aim of this paper is to fill this gap in the literature by analyzing the role of global EPU and the US trade policy uncertainty (TPU) on capital flows in the form of bond and equity investment in the Turkish economy. To measure uncertainty, we use the EPU index developed by Baker, Bloom and Davis (2016), which constructs a text-search mechanism for newspapers based on policy uncertainty keywords. EPU is available for many countries and global EPU is a gross domestic product–weighted average of EPU indices for twenty-one countries.[1] This index is found to be a good proxy for real-world EPU and is widely used (Ajmi, Aye, Balcilar, El Montasser and Gupta 2015; Li et al., 2016; Phan, Sharma and Tran, 2018; Wang, Chen and Huang, 2014).

Because Turkey is a small open economy, international financial fluctuation plays a crucial role in the domestic economy through financial and trade linkages. The growing literature analyzing the effect of EPU on bond and equity markets concentrates mostly on developed countries or groups of developing countries. Unlike the existing literature, this paper conducts an analysis on a small open economy. Hence, we analyze whether uncertainty in global economic policy and trade policy affected capital flows to bond and equity markets in Turkey using a recently developed multivariate time-varying Granger-causality framework by Rossi and Wang (2019). With unstable time series, this methodology is robust to instability, and it allows us to control for other variables and obtain time-varying parameters. We show pronounced evidence of the role of global uncertainty on capital flows to Turkey in the global crisis as well as recent episodes since the beginning of 2018. Although international trade is higher between Turkey and the EU than between Turkey and the US, and Turkey is not a major trade partner of the US, Akkoyun, Guany and Sen-Dogan (2012) show that business cycle synchronization of Turkey with the US is not lower than with the EU. They conclude that when the effect of global changes on the Turkish economy are investigated, attention should not be restricted to direct trade channels. This conclusion and recent US-China trade tensions motivate us to analyze the recently increasing role of US trade policy uncertainty on bond and equity flows to Turkey. Our results provide strong evidence of time-varying causality between capital flows and US trade conflicts.

The remainder of the paper is structured as follows. Sections 2 and 3 explain the data and methodology. Section 4 reports the empirical results, and Section 5 presents the concluding remarks.

## 2. Data

Our data come from the Emerging Portfolio Fund Research (EPFR) global database, which provides monthly fund flows for a vast number of equity and debt mutual funds, exchange traded funds (ETFs), and closely related investment products. The EPFR database covers not only advanced economies but also many EMs. The database includes over 100,000 funds on a global and monthly basis and tracks more than $30 trillion in assets. In addition, the EPFR collects data on country allocations: the proportion of fund assets invested in specific countries. When combined with data on fund flows, the country allocations can be used to construct a measure of country flows. In this paper, we use bond and equity flows for Turkey as well as aggregated equity and bond flows to EMs and developed counterparties.

In addition, we collect data on global EPU from the website www.policyuncertainty.com, constructed by Baker et al. (2016). The EPU index is based on calculating the proportion of newspaper articles that refer to a specific type of uncertainty over a given period. In particular, the EPU index shows the frequency of articles that include terms related to three categories: the economy (E), policy (P), and uncertainty (U). We also use the TPU index of the US developed by Caldara, Iacoviello, Molligo, Prestipino and Raffo (2020). The index reflects the frequency of articles in American newspapers that discuss joint occurrences of terms that are relevant to trade policy (tariffs, import duties, import barriers, and anti-dumping) and uncertainty (uncertainty, risk, or potential).

[1] The list of countries includes Australia, Brazil, Canada, Chile, China, Colombia, France, Germany, Greece, India, Ireland, Italy, Japan, Mexico, the Netherlands, Russia, South Korea, Spain, Sweden, the United Kingdom, and the United States.

Table 1
Descriptive statistics.

| | TRBOND | TREQ | EMEQ | EMBOND | DMEQ | DMBOND | GLOBALEPU | USTPU |
|---|---|---|---|---|---|---|---|---|
| Mean | 0.0 | −2.3 | 1131.9 | 1095.0 | −1407.6 | 16870.5 | 155.7 | 157.4 |
| Median | −0.2 | −14.5 | 1205.8 | 1273.5 | −1736.1 | 20465.5 | 136.1 | 57.6 |
| Maximum | 469.7 | 539.8 | 27442.3 | 18349.5 | 82738.1 | 69839.6 | 359.5 | 1946.7 |
| Minimum | −52.9 | −407.8 | −24761.3 | −18060.2 | −110408.7 | −88471.9 | 75.8 | 10.6 |
| Std. Dev. | 42.5 | 106.9 | 9259.4 | 5515.4 | 26389.6 | 28045.9 | 65.1 | 267.8 |
| Skewness | 9.5 | 1.0 | −0.1 | −0.3 | −0.2 | −0.9 | 1.3 | 3.6 |
| Kurtosis | 105.8 | 8.8 | 3.2 | 3.6 | 4.9 | 4.3 | 4.1 | 19.2 |
| Observations | 143 | 143 | 143 | 143 | 143 | 143 | 143 | 143 |

Notes: TRBOND: Turkey bond flows; TREQ: Turkey equity flows; EMBOND: Emerging markets aggregated bond flows; EMEQ: Emerging markets aggregated equity flows; DMBOND: Developed markets aggregated bond flows; DMEQ: Developed markets aggregated equity flows; GLOBALEPU: Global economic policy uncertainty; USTPU: US trade policy uncertainty. All flow measures are in US million dollars.

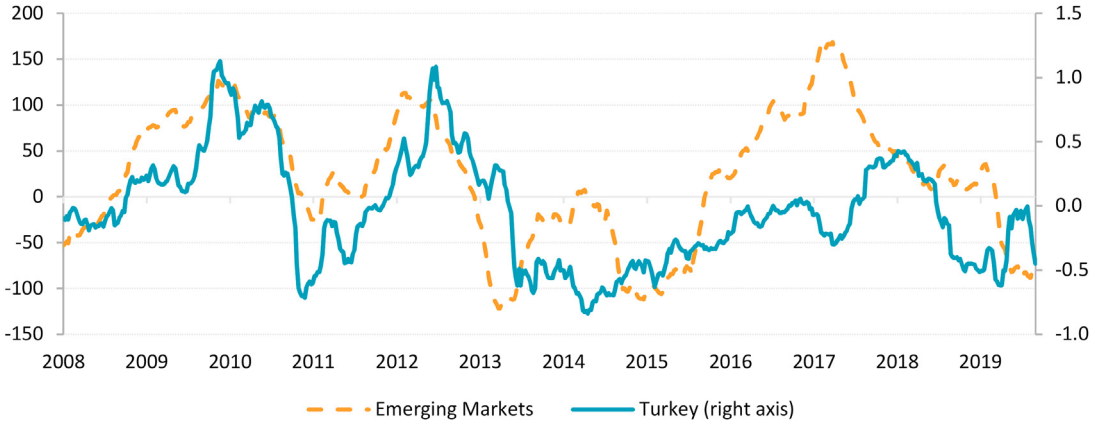
Based on data availability on bond flows, our analysis covers the period January 2008 to November 2019. All flow series are measured in US dollars. We present descriptive statistics in Table 1, which shows that equity flows to EMs and Turkey have a higher standard deviation than bond flows, implying that equity flows are more volatile than bond flows.

Fig. 3 shows abrupt withdrawals of capital flows from EMs and Turkey after the taper tantrum in May 2013, which led to a selloff by EMs because of announcements of the reduction in asset purchases by the Fed. In the following period, the US presidential election and elevated uncertainty over global economic policy due to rising global trade tensions led to considerable capital outflows in EMs and Turkey. The importance of uncertainty regarding policy maker decisions and trade agreements has received increasing attention since 2018. Trade-related uncertainty has risen sharply because of the concern over US-China trade tensions and announcements of various tariffs (Fig. 4). Furthermore, Brexit negotiations with the EU, Italy's fiscal planning, and how the Fed will determine the timing and pace of policy normalization have led to an increase in global EPU, which is particularly important for EMs because of their need for foreign funds.

## 3. Methodology

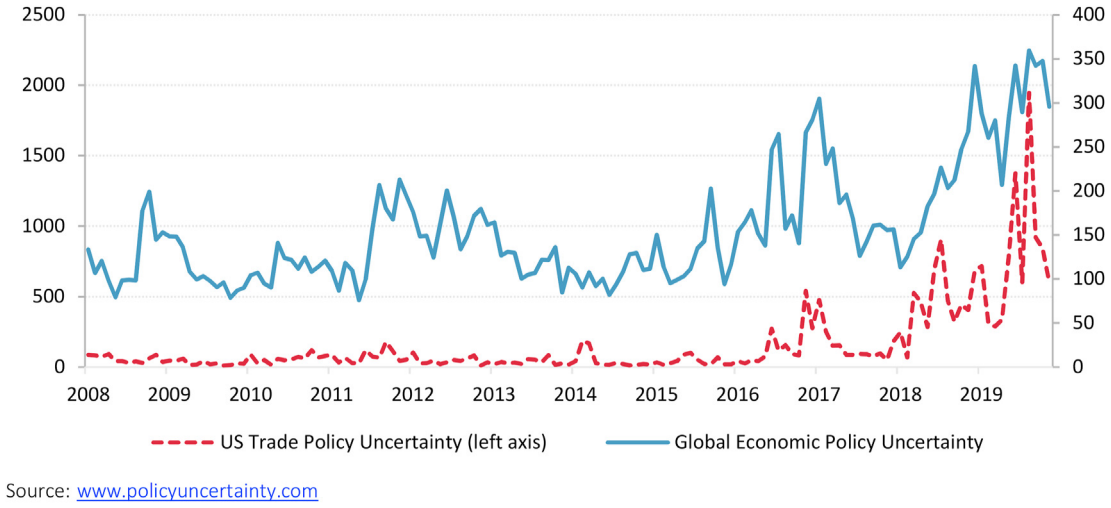
Thanks to their atheoretical nature, flexibility in estimation procedures and ease of interpretation, vector autoregressive (VAR) models, initially introduced by Sims (1980) and Sims, Goldfeld and Sachs (1982), have been used extensively to explore the co-movements among macroeconomic and financial time series. Because VAR-type settings can accommodate multiequation and multivariable structures as well as lead-lag relations, they are frequently chosen for estimation and forecasting. One tool that is particularly relevant to the methodology in this paper is Granger (1969) causality, which aims to reveal whether lagged values of one variable improve prediction of the current values of another one. In practice, Granger causality is derived from reduced-form VARs to characterize interdependence.

However, as noted in Stock and Watson (2006) and Rossi (2013), VAR analyses and accompanying causality inferences are subject to important practical challenges. Apart from the requirement of stationary data in small-scale VARs, model specifications might be subject to instability arising from structural breaks and regime shifts, which hinder




Note: The graphs show moving average of 52-week cumulative sum.

Fig. 3. Capital Flows Towards EMs and Turkey (Billion USD dollars). Note: The graphs show moving average of 52-week cumulative sum.




Source: www.policyuncertainty.com

Fig. 4. Historical perspective of uncertainty indices. Source: www.policyuncertainty.com.

inference and forecasting capabilities (Clark & McCracken, 2006). In this context, embedded causality relations between two series might not be incorporated into a linear time-invariant estimation. More importantly, as demonstrated by Rossi (2005), traditional VAR-based test statistics are not valid for conclusions about statistical significance.

In this paper, we use the Granger-causality test proposed by Rossi and Wang (2019), which is robust to the presence of instability. In addition to accounting for instability and revealing the statistical significance of the causal relation over the sample period, this method is also more effective than the CUSUM (Cumulative Sum Control Chart) test, which is known to perform poorly when applied to a finite sample (Brown, Durbin and Evans, 1975).

Following Rossi and Wang (2019), we present two different variants of empirical identification. First, a reduced-form VAR with time-varying parameters is considered:

$$A_t(L)y_t = u_t \tag{1}$$

$$A_t(L) = I - A_{1,t}L - A_{2,t}L^2 - \ldots - A_{p,t}L^p \tag{2}$$

$$u_t \overset{iid}{\sim} (0, \Sigma) \tag{3}$$

where $A_{j,t}$ represents an $n\,x\,n$ coefficient matrix with time-varying properties, $y_t = [y_{1,t},\ y_{2,t}, \ldots, y_{n,t}]'$ is an $n\,x\,1$ vector of endogenous variables, and $u_t$ stands for error terms. Here, unlike traditional unrestricted VAR models, error terms can accommodate idiosyncratic shocks, which are assumed to be heteroskedastic and serially correlated.[2]

In the second specification, a direct multistep VAR–linear projection (VAR-LP) forecasting model with time-varying parameters is considered (Jordà, 2005). By iterating Eq. (2) and projecting $y_{t+h}$ (where $h$ refers to the forecast horizon) onto the linear space spanned by $(y_{t-1}, y_{t-2}, \ldots, y_{t-p})'$, the following equation can be obtained:

$$y_{t+h} = \Psi_{1,t}y_{t-1} + \Psi_{2,t}y_{t-2} + \ldots + \Psi_{p,t}y_{t-p} + \varepsilon_{t+h} \tag{4}$$

In this context, $\Psi_{j,t}$ is a function of time-varying coefficient matrices, and $\varepsilon_{t+h}$ is defined as the moving average of errors from $t$ to $t+h$.[3] If we specify $\phi_t$ as an appropriate subset of the vector including $(\Psi_{1,t},\ \Psi_{2,t}, \ldots, \Psi_{p,t})$, then, in both specifications, a robustness test of Granger causality aims to assess the validity of the following null hypothesis:

$$H_0 :\ \phi_t = 0, \textit{ for all } t = 1,\ \ldots, T \tag{5}$$

Multiple test statistics are chosen to evaluate this null hypothesis, specifically, the exponential Wald test (*ExpW*), the mean Wald test (*MeanW*), the Nyblom test (*Nyblom*), and the Quandt likelihood test (*SupLR*), as pointed out in Rossi (2005). *ExpW* and *MeanW* are proposed in Andrews and Ploberger (1994). Whereas the *ExpW* test is powerful to evaluate alternatives that are distant from the null hypothesis, *MeanW* is designed to assess closer alternatives. However, the Nyblom test is locally very powerful to investigate the consistency of processes against a random walk, as specified by Nyblom (1989). Moreover, the *SupLR* test statistic is based on the *SupLR* test proposed by Andrews (1993).

Specifically, we first assess the impact of global policy uncertainty on bond and equity flows to Turkey using the following two vectors of endogenous variables:

$$y_t = [TRBOND_t, EMBOND_t, DMBOND_t, GLOBALEPU_t]' \tag{6}$$

[2] Estimations are conducted with VAR(1) models as indicated by the SIC values. We choose the 5% trimming value, as opposed to 15%, which is widely preferred in this stream of literature. This choice is driven by the argument that considering the small sample in our framework, we aim to preserve the highest possible number of observations to improve inferences. Estimations are repeated with a 10% trimming value, and the results are not significantly changed.

[3] Three-, six-, and nine-months-ahead forecast horizons are used in VAR-LP estimations.

$$y_t = [TREQ_t, EMEQ_t, DMEQ_t, GLOBALEPU_t]' \quad (7)$$

In these equations, $GLOBALEPU_t$ is the global EPU index constructed by Baker et al. (2016). $DMBOND_t$, $EMBOND_t$, and $TRBOND_t$ represent capital flows to debt securities in developed markets, EMs, and Turkey, respectively, which are all retrieved from the EPFR database. Similarly, $DMEQ_t$, $EMEQ_t$, and $TREQ_t$ correspond to capital flows to developed markets, EMs, and Turkey for equity instruments.

Previous empirical finance literature has established a framework in which capital flows to EM economies are influenced by push and pull factors, since the seminal works of Calvo et al. (1993) and Fernandes-Arias (1996). In this context, push factors mostly correspond to global forces that determine the supply of funds, such as global liquidity conditions, the monetary policy stance of developed economies, and investor risk aversion. In the most recent example, after the GFC, loosening in monetary policy, abundant global liquidity backed up by quantitative-easing policies, and "risk-seeking" behavior by investors (due to very low yields in developed markets) all had enhanced capital flows toward EM markets. Moreover, the variation in EM capital flows also reflects the pull factors, which means domestic macrofinancial forces that determine the attractiveness of EM markets as flow destinations (IMF, 2012). Local economic activity, the institutional setting, the resilience of the economy measured by the risk premium and the domestic interest rate can be listed as such factors. Building on these views, we proceed with the inclusion of "capital flows to EMs" and "capital flows to developed markets" as the rough control variables for push and pull factors. Although the idea behind this notion has been somewhat weakened over time recently, it is mentioned in the previous literature asserting that global investors consider EM countries a separate/single asset class when making investment decisions in both equities and bonds, governed by the spillover effects from developed to EM economies as well as financial contagion among EMs (Brunnermeier & Huang, 2018; Eling & Faust, 2010; Pretorius, 2002; Saret, 2014; Cepni & Güney, 2019). Building on the distinction between EM and DM economies as different asset classes, the inclusion of "capital flows to EMs" might account for push factors, whereas "capital flows to developed markets" might represent pull factors in our estimations.

In the following step, considering that recent periods are characterized by rising uncertainty about trade policies and increasing emphasis on protectionist policy measures, we focus on a subcomponent of policy uncertainty, which is trade policy. In addition to the general impact of global uncertainty, we revise the earlier estimations by replacing global EPU with the US TPU Index, again developed by Baker et al. (2016), as follows:

$$y_t = [TRBOND_t, EMBOND_t, DMBOND_t, USTPU_t]' \quad (8)$$

$$y_t = [TREQ_t, EMEQ_t, DMEQ_t, USTPU_t]' \quad (9)$$

Table 2
Time-varying parameter Granger causality tests (VAR model).

| Direction of causality | Test type | Test statistic | p-value |
|---|---|---|---|
| $GLOBALEPU_t \rightarrow TRBOND_t$ | ExpW | 55.92 | 0.00 |
| $GLOBALEPU_t \rightarrow TRBOND_t$ | MeanW | 30.01 | 0.00 |
| $GLOBALEPU_t \rightarrow TRBOND_t$ | Nyblom | 7.04 | 0.00 |
| $GLOBALEPU_t \rightarrow TRBOND_t$ | SupLR | 121.55 | 0.00 |
| $GLOBALEPU_t \rightarrow TREQ_t$ | ExpW | 41.57 | 0.00 |
| $GLOBALEPU_t \rightarrow TREQ_t$ | MeanW | 20.10 | 0.00 |
| $GLOBALEPU_t \rightarrow TREQ_t$ | Nyblom | 19.62 | 0.00 |
| $GLOBALEPU_t \rightarrow TREQ_t$ | SupLR | 92.75 | 0.00 |

## 4. Empirical findings

Table 2 displays the empirical results of reduced-form VAR-based robust Granger-causality tests.[4] Overall, a test statistic that is robust to instability indicates that there exists a unanimously statistically significant Granger causality established from global policy uncertainty to bond flows. As shown by test results, the predictive ability of $GLOBALEPU_t$ for bond flows is inherently time varying. Second, all test statistics lead us to conclude in favor of the argument that $GLOBALEPU_t$ Granger causes equity flows to the Turkish economy on a time-varying basis. In the context of instability, these results confirm our expectation that because of the financial and economic shocks that occurred throughout the sample period, the degree of the relationship between global policy volatility and capital flows might vary over time.

To obtain more information about the relationship, we construct the course of Wald statistics over the sample period, as presented in Figs. 5 and 6. In terms of the impact on bond flows, the Granger causality stemming from $GLOBALEPU_t$ gets stronger during three major events: the global financial crisis, the taper tantrum, and the post-2018 era. In other words, the contribution to in-sample predictive power from lagged values of global policy shocks is more prominent during periods characterized by a considerable reduction in the appetite for global risk.

As argued by Gauvin et al. (2014) and Byrne and Fiess (2016), bond flows to EM countries tend to be sensitive to the course of global risk perception. In fact, these periods are accompanied by downward pressure in asset prices, rising market volatility, and a divergence in forecasts, which all lead global investors to less risky assets, causing outflows from EM assets. More strikingly, the recent predictive ability of global policy shocks for bond flows has reached unprecedented levels that were observed only during the Great Recession.

However, as seen in Fig. 6, the impact of global uncertainty on equity flows to Turkey shows somewhat different patterns. The empirical literature discusses the importance of pull factors in equity flows, including the growth prospects of local EM economies (Sarno,Tsiakas and Ulloa, 2016). Hence, the relation between $GLOBALEPU_t$ and equity flows appears

[4] We first implemented the standard constant parameter Granger-causality test and found no evidence that global EPU and US TPU Granger cause the bond and equity flows to Turkey.


Fig. 5. Time-varying wald statistics (VAR model, testing GLOBALEPU Granger causes TRBOND).

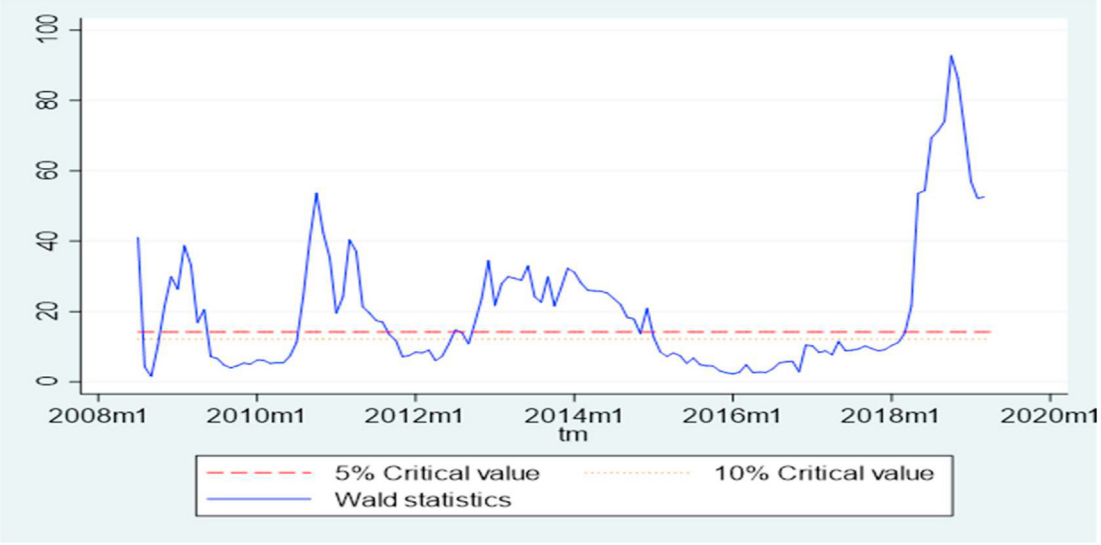



Fig. 6. Time-varying wald statistics (VAR model, testing GLOBALEPU Granger causes TREQ).

stronger when the Turkish economy faces a tendency toward lower growth. Although global economic policy-induced shocks do Granger cause capital flows in the same periods, the effect is more pronounced in recent episodes, especially since the beginning of 2018, when very short positions were taken in Turkish equities. Furthermore, as observed in Fig. 6, the causal relationship is highly significant throughout the period 2010–2012. This episode can be regarded as one of significant inflows to local financial assets (mainly equities) after improvements in the growth outlook, gross capital formation, firm sales, and corporate profitability.

In the following step, the same analysis is repeated with the endogenous variable $USTPU_t$ as a proxy for trade policy-induced shocks. Our results in Table 3 show that most of the test statistics (except for those of the Nyblom test) reject the null hypothesis. Hence, time-varying Granger causality can be established from the TPU to bond and equity flows toward

Table 3
Time-varying parameter Granger causality tests (VAR model).

| Direction of causality | Test type | Test statistic | p-value |
|---|---|---|---|
| $USTPU_t \rightarrow TRBOND_t$ | ExpW | 103.09 | 0.00 |
| $USTPU_t \rightarrow TRBOND_t$ | MeanW | 37.73 | 0.00 |
| $USTPU_t \rightarrow TRBOND_t$ | Nyblom | 1.45 | 0.21 |
| $USTPU_t \rightarrow TRBOND_t$ | SupLR | 215.89 | 0.00 |
| $USTPU_t \rightarrow TREQ_t$ | ExpW | 99.53 | 0.00 |
| $USTPU_t \rightarrow TREQ_t$ | MeanW | 14.26 | 0.00 |
| $USTPU_t \rightarrow TREQ_t$ | Nyblom | 1.28 | 0.27 |
| $USTPU_t \rightarrow TREQ_t$ | SupLR | 208.37 | 0.00 |

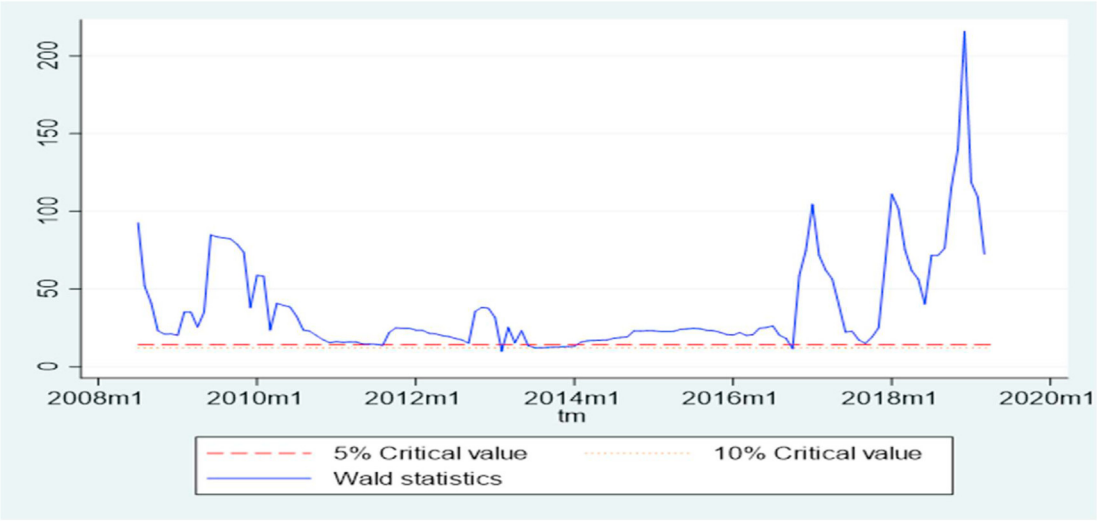



Fig. 7. Time-varying wald statistics (VAR model, testing USTPU Granger causes TRBOND).

local financial assets issued by domestic firms in Turkey. In the case of bond flows, although the causality from US TPU is often statistically significant in the sample period, the level of significance increased markedly in two episodes (Fig. 7). The first one is the GFC from 2008 to 2010, when global trade is substantially squeezed because of a decline in aggregate demand in advanced economies. This created higher uncertainty in global trade policies, led mainly by the US, as well as a dramatic drop in the Turkish export revenue. Rising trade uncertainty in this era Granger caused bond flows to Turkey to slow significantly. Another period when the casualty from US TPU to bond flows surged was the beginning of the Trump administration at the end of November 2016. The administration's disputes over trade agreements and unions as well as the protectionist measures enacted by the administration increased the TPU index in this period.

Although in 2017, the Wald statistics decline, they sharply increased after the second quarter of 2018. This might be related to the prosperous economic growth attained because of the government's incentives in the form of credit guarantees for real sector firms. This favorable growth environment enlarged the current account deficit, hence the need for external financing has also risen. A surge in bond flows occurred in this nearly one-year period, though trade uncertainty was still high. Hence, in this period, the link between trade uncertainty and bond flows was severed. Nevertheless, bond flows were adversely affected by financial volatility and turbulence in the foreign exchange market in August 2018. As expected, however, the statistical significance of the relationship is evident in only recent episodes during which global trade issues and protectionist measures became substantial risk factors, creating downward pressure on global growth, trade

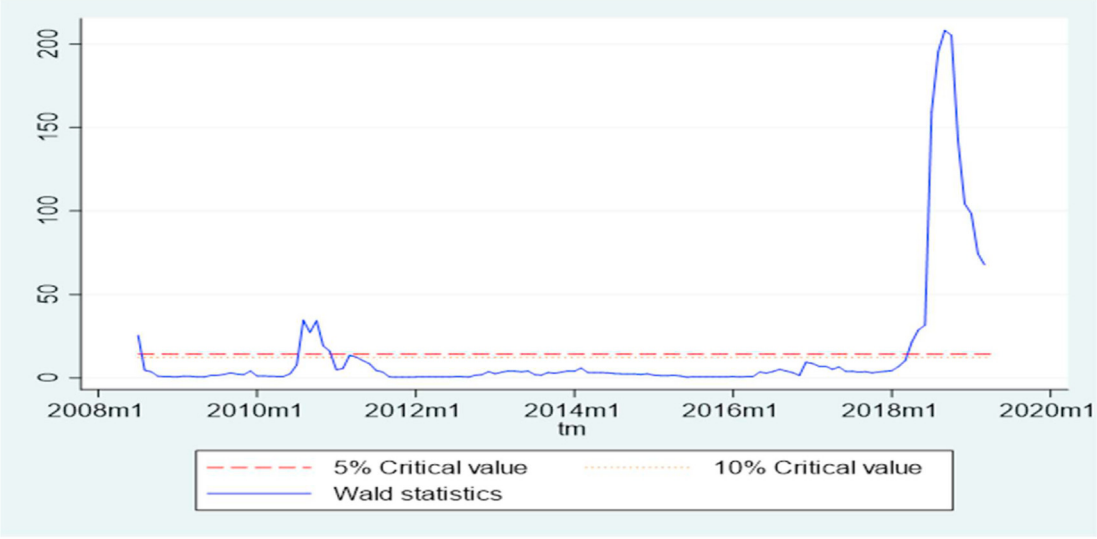



Fig. 8. Time-varying wald statistics (VAR model, testing USTPU Granger causes TREQ).

Table 4
Time-varying parameter Granger causality tests (VAR-LP forecasting model).

| Direction of causality | Test type | Test statistic | p-value |
|---|---|---|---|
| ***3-Months Ahead*** | | | |
| $GLOBALEPU_t \rightarrow TRBOND_t$ | ExpW | 79.83 | 0.00 |
| $GLOBALEPU_t \rightarrow TRBOND_t$ | MeanW | 26.33 | 0.00 |
| $GLOBALEPU_t \rightarrow TRBOND_t$ | Nyblom | 22.34 | 0.00 |
| $GLOBALEPU_t \rightarrow TRBOND_t$ | SupLR | 169.34 | 0.00 |
| ***6-Months Ahead*** | | | |
| $GLOBALEPU_t \rightarrow TRBOND_t$ | ExpW | 79.22 | 0.00 |
| $GLOBALEPU_t \rightarrow TRBOND_t$ | MeanW | 70.98 | 0.00 |
| $GLOBALEPU_t \rightarrow TRBOND_t$ | Nyblom | 343.04 | 0.00 |
| $GLOBALEPU_t \rightarrow TRBOND_t$ | SupLR | 166.67 | 0.00 |
| ***9-Months Ahead*** | | | |
| $GLOBALEPU_t \rightarrow TRBOND_t$ | ExpW | 75.80 | 0.00 |
| $GLOBALEPU_t \rightarrow TRBOND_t$ | MeanW | 34.69 | 0.00 |
| $GLOBALEPU_t \rightarrow TRBOND_t$ | Nyblom | 94.21 | 0.00 |
| $GLOBALEPU_t \rightarrow TRBOND_t$ | SupLR | 160.88 | 0.00 |
| ***3-Months Ahead*** | | | |
| $GLOBALEPU_t \rightarrow TREQ_t$ | ExpW | 44.64 | 0.00 |
| $GLOBALEPU_t \rightarrow TREQ_t$ | MeanW | 42.15 | 0.00 |
| $GLOBALEPU_t \rightarrow TREQ_t$ | Nyblom | 19.16 | 0.00 |
| $GLOBALEPU_t \rightarrow TREQ_t$ | SupLR | 98.18 | 0.00 |
| ***6-Months Ahead*** | | | |
| $GLOBALEPU_t \rightarrow TREQ_t$ | ExpW | 51.56 | 0.00 |
| $GLOBALEPU_t \rightarrow TREQ_t$ | MeanW | 33.29 | 0.00 |
| $GLOBALEPU_t \rightarrow TREQ_t$ | Nyblom | 112.042 | 0.00 |
| $GLOBALEPU_t \rightarrow TREQ_t$ | SupLR | | 0.00 |
| ***9-Months Ahead*** | | | |
| $GLOBALEPU_t \rightarrow TREQ_t$ | ExpW | 121.631 | 0.00 |
| $GLOBALEPU_t \rightarrow TREQ_t$ | MeanW | 64.366 | 0.00 |
| $GLOBALEPU_t \rightarrow TREQ_t$ | Nyblom | 55.620 | 0.00 |
| $GLOBALEPU_t \rightarrow TREQ_t$ | SupLR | 252.844 | 0.00 |

Table 5
Time-varying parameter Granger causality tests (VAR-LP forecasting model).

| Direction of causality | Test type | Test statistic | p-value |
|---|---|---|---|
| ***3-Months Ahead*** | | | |
| $USTPU_t \rightarrow TRBOND_t$ | ExpW | 15.829 | 0.00 |
| $USTPU_t \rightarrow TRBOND_t$ | MeanW | 9.912 | 0.03 |
| $USTPU_t \rightarrow TRBOND_t$ | Nyblom | 3.147 | 0.03 |
| $USTPU_t \rightarrow TRBOND_t$ | SupLR | 41.217 | 0.00 |
| ***6-Months Ahead*** | | | |
| $USTPU_t \rightarrow TRBOND_t$ | ExpW | 12.840 | 0.00 |
| $USTPU_t \rightarrow TRBOND_t$ | MeanW | 12.509 | 0.00 |
| $USTPU_t \rightarrow TRBOND_t$ | Nyblom | 3.320 | 0.03 |
| $USTPU_t \rightarrow TRBOND_t$ | SupLR | 33.306 | 0.00 |
| ***9-Months Ahead*** | | | |
| $USTPU_t \rightarrow TRBOND_t$ | ExpW | 73.857 | 0.00 |
| $USTPU_t \rightarrow TRBOND_t$ | MeanW | 20.858 | 0.00 |
| $USTPU_t \rightarrow TRBOND_t$ | Nyblom | 1.199 | 0.29 |
| $USTPU_t \rightarrow TRBOND_t$ | SupLR | 157.058 | 0.00 |
| ***3-Months Ahead*** | | | |
| $USTPU_t \rightarrow TREQ_t$ | ExpW | 46.855 | 0.00 |
| $USTPU_t \rightarrow TREQ_t$ | MeanW | 20.222 | 0.00 |
| $USTPU_t \rightarrow TREQ_t$ | Nyblom | 4.146 | 0.00 |
| $USTPU_t \rightarrow TREQ_t$ | SupLR | 103.244 | 0.00 |
| ***6-Months Ahead*** | | | |
| $USTPU_t \rightarrow TREQ_t$ | ExpW | 122.487 | 0.00 |
| $USTPU_t \rightarrow TREQ_t$ | MeanW | 94.598 | 0.00 |
| $USTPU_t \rightarrow TREQ_t$ | Nyblom | 3.690 | 0.02 |
| $USTPU_t \rightarrow TREQ_t$ | SupLR | 256.604 | 0.00 |
| ***9-Months Ahead*** | | | |
| $USTPU_t \rightarrow TREQ_t$ | ExpW | 204.977 | 0.00 |
| $USTPU_t \rightarrow TREQ_t$ | MeanW | 120.084 | 0.00 |
| $USTPU_t \rightarrow TREQ_t$ | Nyblom | 2.905 | 0.04 |
| $USTPU_t \rightarrow TREQ_t$ | SupLR | 419.040 | 0.00 |

volume, and capital flows. A similar pattern is observed in Fig. 8, where US TPU predicts the equity flows to Turkey, with the effect picking up from 2018.

Because the in-sample predictability of the global EPU and US TPU does not guarantee out-of-sample predictability, we repeat the earlier analysis with a multistep VAR-LP forecasting model over horizons of three, six, and nine months ahead, assuming heteroskedastic and serially correlated shocks. The in-sample informative nature of global policy uncertainty for capital flows is supported by statistically significant out-of-sample predictability (Tables 4 and 5). All test statistics for both equity and bond flows indicate that the realization of global uncertainty can be used to predict the course of capital flows when instability and the time-varying nature are taken into consideration.

Furthermore, when we consider causality originating in US TPU to capital flows, the overwhelming majority of test statistics (except for the Nyblom statistic in some cases) points to the predictive power of uncertainty indicators for capital flows in Turkey. In other words, both uncertainty indexes can predict capital flows to Turkey, whether in- or out-of-sample.

## 5. Conclusion

In this study, we analyze the relationship between global EPU and capital flows to the bond and equity markets in Turkey. We also investigate the link between the US TPU and bond-equity flows. Our findings suggest that significant causality exists from global EPU to bond and equity flows. The significance of Granger causality from EPU to bond flows sharply increased in periods of financial distress, such as the GFC, the taper tantrum, and the second half of 2018. Similar findings are observed in the causality from EPU to equity flows, with the exception of the period between 2010 and 2012. At the same time, our results demonstrate that in the overall sample period, the causality link was weaker with the USTPU index than the global EPU index. Nevertheless, the Wald statistics improved at the beginning of Trump administration, when protectionist policies started to intensify. Following this period, TPU became a significant predictor of bond and equity flows to Turkey. Finally, we found that global policy uncertainty and the US TPU are significant out-of-sample predictors of equity and bond flows in Turkey. Two uncertainty indicators capture essential information to forecast capital flows in bond and equity markets three, six, and nine months ahead.

Overall, our findings suggest that capital flows to Turkey are directly related to uncertainty in global economic policy, particularly in periods of elevated uncertainty. One policy implication of these results could be a strong commitment to appropriate macroeconomic policies and prudential tools to mitigate the effects of volatility in capital flows, which would improve investor confidence during times of elevated uncertainty. Moreover, global investors could use our findings to

develop simple trading strategies, by taking long positions in financial assets that are less affected by uncertainty shocks in periods of heightened uncertainty. Our empirical results also highlight possible improvements that could be made in the forecasting of capital inflows by including proxies for global uncertainty. In other words, the use of global uncertainty and trade uncertainty indexes as integral parts of the larger macrofinancial datasets (used to predict capital flows) would result in fewer forecast errors, especially during periods of turmoil, such as the recent episodes, during which the time-varying association between global uncertainty and capital inflows to Turkey was strengthened.

## Conflict of interest

We have no conflicts of interest to disclose.

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